

# TANS, DEQ Website, and Modern Real-time Monitoring

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# Overview

- TANS
- DEQ Website
- 5 Myths in Water System Security
- Modern Real-time Monitoring
  - Old school v. New school
  - Modern Monitoring Techs
  - 2 Integrative Solutions: Hach's Event Monitor, YSI's EcoNet
  - RIP Dascore
  - JMAR's BioSentry
- Conclusion

# TANS, Threat Advisory Notification System

TANS

DEQ Website

5 Myths in Water System Security

Modern Real-time Monitoring

Conclusion

## Rapid, Articulate and Meaningful Information Distribution

- ~550 W/WW Officials
- ~50 Local Health Officials
- 15 Notices since Inception  
in December 2003
- Do you want to join? Email

[deq-threatad@mi.gov](mailto:deq-threatad@mi.gov)



[www.virginiaestatelaw.com](http://www.virginiaestatelaw.com)

# Five Most Recent Notices

	TANS Notice	Date Sent
11 <sup>th</sup>	DHS Interim National Infrastructure Protection Plan	Feb. 14 <sup>th</sup> 2005
12 <sup>th</sup>	Official EPA Emergency Response Tabletop Exercises	Mar. 16 <sup>th</sup> 2005
13 <sup>th</sup>	American College of Preventative Medicine: Recognizing Waterborne Disease	Mar. 28 <sup>th</sup> 2005
14 <sup>th</sup>	Distribution System Security Primer for Water Utilities	May 23 <sup>rd</sup> 2005
15 <sup>th</sup>	Security Information Collaboratives	May 23 <sup>rd</sup> 2005

# DEQ Website

- TANS Index
- HSPD Index
- Links to Websites
- Real-time Monitoring Info
- Government Policy Docs
- Emergency Action Card
- 8 Req's of the Bioterrorism Act

**DEQ** Department of Environmental Quality

Michigan.gov Home | DEQ Home | Online Services | Permits | Programs | Site Map | Contact DEQ

**WATER**

- Biosolids & Industrial Pretreatment
- Drinking Water
- Emergency Response for Releases to Water
- Great Lakes
- Groundwater Discharge
- Groundwater Modeling
- Inland Lakes & Streams
- Mosquito Control Projects
- Surface Water
- Water and Wastewater Security**
- Water Management
- Water Quality Monitoring
- Wetlands Protection

**Water and Wastewater Security**

Due to terrorist attacks on September 11, 2001, and recent federal legislation and state authorizations, the Michigan Department of Environmental Quality (MDEQ), Water Bureau(WB), actively participates in numerous Infrastructure Security Program activities. The federal Public Health Security and Bioterrorism Preparedness and Response Act of 2002 (Bioterrorism Act) requires drinking water systems to comply with requirements by certain dates as a part of the nation's homeland security efforts. The WB plays a critical role in training and assisting the drinking water and wastewater systems in complying with the federal Infrastructure Security Program. Here is a [introductory powerpoint presentation](#) (10MB) outlining the major challenges of Water and Wastewater Security.

**Vulnerability Assessment Workshop** Municipalities Click Here to **Register for Training** Provided by **CDM**

Municipalities: Register today for Phase II Water Security Vulnerability Assessment Training! Phase II is exclusively for municipalities with 3300 people or less. Participation is voluntary. This Vulnerability Assessment and Emergency Response Plan Water Security Training is provided by the MDEQ contractor Camp Dresser & McKee (CDM).

**Information**

- Homeland Security Presidential Directives (HSPD) Index
- Threat Advisory Notification System [TANS] Index
- Water Security Photo Gallery
- Instructions on sending your VA/ERP to EPA PDF
- EPA Security Guidance for Drinking Water Facilities

[http://michigan.gov/deq/0,1607,7-135-3313\\_23413---,00.html](http://michigan.gov/deq/0,1607,7-135-3313_23413---,00.html)

# Links

- AWWA
- DHS
- EPA

The image displays three overlapping screenshots of government websites, each highlighted with a yellow border. The top-left screenshot is from GlobalSecurity.org, showing a navigation menu with categories like Military, Navy, and Air Force, and a search bar. The top-right screenshot is from FEMA, featuring the FEMA logo and a navigation menu with links to Disaster Communities, Emergency Personnel, and Education & Training. The bottom screenshot is from the EPA's Water and Wastewater Security Product Guide, showing the title, a search bar, and an overview section discussing the importance of water and wastewater system security.

**GlobalSecurity.org**

Education Home Loans Travel Featured Sponsor

Home Military Agencies Army NORA SECURITY ROMS

Enter search term

Submit Advanced

**MILITARY**

Weapons of Mass Destruction Civil Support Teams

**Military**

- Introduction
- Systems
- Facilities
- Agencies
- Industry
- Operations
- Countries
- Hot Documents
- News
- Reports
- Policy
- Budget
- Contracts
- Links

WMD

Intelligence

Homeland Security

Space

Public Eye

**FEMA**

Disaster Communities Emergency Personnel Education & Training News Media Regions

Hazards Assistance Flood Maps NPSC Preparedness Disaster Fact Sheets Declared Disasters

Search FEMA

Advanced Search

FEMA on Español

U.S. Fire Administration

Litigation & Financial Insurance

Urban Search & Rescue

NIIMS Integration

- Office of National Security Coordination
- FEMA for Kids
- FEMA Flood Maps
- Citizen Corps
- DisasterHelp.gov
- Ready.gov
- About FEMA
- Under Secretary
- Michael D. Brown
- History
- FEMA FY03 - Site
- Customer Service
- Staff Directory
- State Offices & Agencies
- Contacts/Feedback
- Employment Opportunities
- FEMA Partners
- Joining Business with FEMA

**U.S. Environmental Protection Agency**

**Water and Wastewater Security Product Guide**

Recent Additions | Contact Us | Print Version Search: GO

EPA Home > Ground Water & Drinking Water > Water Security > Security Product Guide

**Security Product Guide** Table of Contents

**Overview**

Recent events have created a heightened awareness of security at the nation's critical infrastructure, including its drinking water and wastewater systems. These systems are potentially vulnerable to different kinds of natural disasters and terrorist threats. EPA has developed a series of Security Product Guides to assist treatment plant operators and utility managers in reducing risks from, and providing protection against, possible natural disasters and intentional terrorist attacks.

The guides provide information on a variety of products available to enhance physical security, gates, and manhole locks to delay unauthorized entry into buildings or pipe systems security (such as computer firewalls and remote monitoring systems that can detect leaks). Other guides present information on monitoring tools that can be used to identify or finished water that may represent potential threats. Individual products evaluate the applicability of distribution systems, wastewater collection systems, pumping stations, main plant and remote sites, personnel entry, chemical delivery and storage, and water and wastewater treatment systems.

# Cheat Card

- Emergency Action Card
- Cut out, Fill out, Laminate
- Quick reference for facility personnel
- Cheating is OK if you're the good guys

## **EMERGENCY ACTION CARD**

*Carry this card in a wallet or ID chain*

Name:

If you encounter a security breach or terrorist event:

Immediately Call:

- 1 Immediate Supervisor:
- 2 Plant Manager:
- 3 Local Law Enforcement:
- 4 DEQ District Engineer:

If you suspect contamination:

Also Call:

- 1 51st WMD-CST:
- 2 Neighboring Water System:
- 3 Nearest Local Hospital:

## **INCIDENT RESPONSE PROCESS**

### **1 Recognize An Incident**

*Broken Lock, Unknown Powder, Alarm, Unknown Contamination.*

### **2 How Severe is it?**

*How many systems are affected? Consider worst case scenarios.*

### **3 Call For Help**

*PHONE NUMBERS ON REVERSE SIDE.*

### **4 How could Water Quality be Impacted?**

*What systems are compromised? Pipe, tank, pump, valves, chemical storage?*

### **5 Prevent the Contamination from Spreading**

*DO NOT RUSH TO FLUSH. Isolate and Contain the Contamination.*

*Location may become a CRIME SCENE. Minimize damage to evidence.*

## **Instructions**

1. Print card on heavyweight paper or poster board
2. Correctly fill in the emergency contact phone numbers
3. Cut the individual sides from the paper
4. Laminate both sides together (laminate can be found at Meijers/Walmart)

# 5 Water System Myths

## 1. MYTH: Dilution is the best solution

- In cases of water system contamination, containment is the best solution!
- Biological agents don't need high concentrations to reach potency

## 2. MYTH: Treated water is stable

- Once the water has left the water facility, loss of control in:
  - Temperature
  - Turbidity
  - Dissolved minerals
  - Radiation, Superbowl 2003, San Diego, spikes of 20x above baseline

## 3. MYTH: Water systems have unidirectional flow

- Flow is a function of many variables:
  - Demand from terminal ends
  - Pipe diameters
  - Elevation
  - Water system layout



# 5 Water System Myths

4. MYTH: As long as I don't drink contaminated water, I'll be fine
  - Biological/Chemical agents can aerosolize on contact with air
  - Continued terminal use = continued water system flow = greater difficulty containing contamination
  - General Public need to be aware of "Do Not Use" advisory
5. MYTH: Don't worry, we can always kill the pumps and close the valves
  - Water pipe implosions
    - In some old infrastructures, the water pressure keeps the pipe from collapsing
  - Water integrity upon resumption
    - Reversed/unpredictable flow on loss of pressure
    - Substances seeping back into non-pressurized pipes
  - Serious implications for:
    - Fire departments
    - Hospitals

# Modern Real-time Monitoring

- Old school vs. New school: Grab sampling and Automated sampling
- Modern monitoring techs
  - Radiation
  - Chemical
  - Biological
- 2 Integrative Solutions
  - Hach's Event Monitor
  - YSI's EcoNet
- RIP Dascore
- JMAR's BioSentry

# Old school v. New School

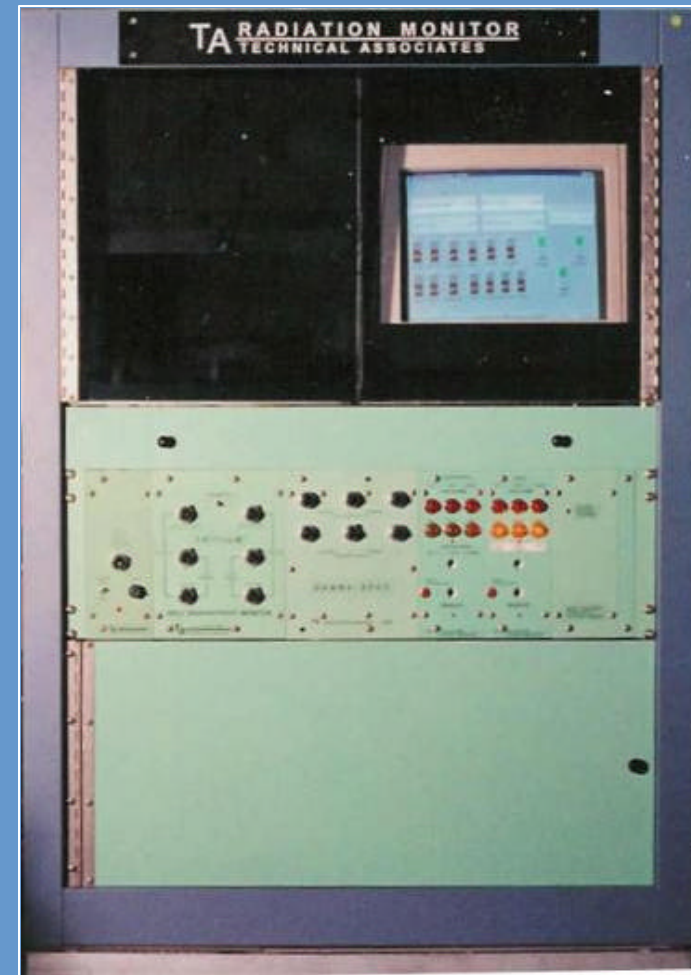
- Continuous Online
  - Pros
    - Unattended
    - Immediate Notification
  - Cons
    - Fixed Location
    - Cost Prohibitive
    - Accuracy and Reliability
    - Infrastructure Requirements
- Grab Sample
  - Pros
    - Mobile
    - Cheap
  - Cons
    - Not effective for rapid identification of problems
    - Human Labor
    - Sample may change on the way to the lab



<http://www.waynecounty.com/coalitiontochangetheculture/imgs/conflict.jpg>

# Radiation Monitoring

- Limited Number of RTM Products
  - Technical Associates
    - SSS-33-5FT
    - MEDA-5T
  - Canberra
    - OLM-100, ILM-100
  - DoD, Los Alamos, prototype
  - \$20,000-\$75,000
- Grab-Sample still recommended as method of choice



# Chemical Monitoring

## 1. Chlorine Concentration

- Many organisms/toxins combine with chlorine
- Chlorine as a surrogate for detection (req'd SDWA)
- Not everything reacts with chlorine:
  - Anthrax, T-2 Mycotoxin, Microcystins, Ricin
  - Cryptosporidiosis
- Three featured RTM products:
  - HACH CL-17
  - GLI/HACH AccuChlor2
    - Food-grade vinegar as a buffer
  - Teledyne Isco Orbit Chlorine Analyzer
- Cost range: \$2,700-\$10,000

### Maintenance Requirements

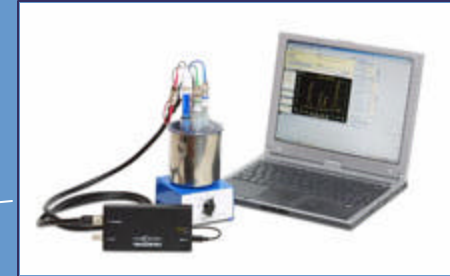
- Regular replenishment of consumables (reagents, buffers)
- Periodic maintenance and calibration



# Chemical Monitoring

## 2. Arsenic Concentration

- Required to monitor by the SDWA
- No off-the-shelf RTM solutions exist, laptop-enabled portable sensors are available
  - TraceDetect Nano-Band Explorer
  - Monitoring Technologies International's PDV-6000
- Products inaccurate, still useful for water security, (i.e. deviation from norm is cause for alarm)



## 3. TOC Analyzers (total organic carbon)

- High or Low temperature analyzers (high being more sensitive)
- Surrogate for contaminants, deviation from average is cause for alarm, high sensitivity devices not required
- Many RTM devices on market
  - Hach 1950plus
  - GMI-Shimadzu TOC 5000
- \$18,000-\$28,000



### Maintenance Requirements

- Weekly maintenance and calibration (recommended)

# Biological Monitoring

## 1. BOD analyzer (biochemical oxygen demand)

- Surrogate method measures respiration of biomass, interpreting less respiration as presence of toxin
- Used in Europe for decades
  - Envitech's STIPTOX-adapt
  - \$20,000 to \$30,000
- System attempts to preserve biomass

## 2. Luminescent Toximeters

- Surrogate method measures luminescence of *Vibrio fischeri*, interpreting less luminescence as presence of toxin
- No current RTM products exist
- Two laboratory products
  - Microtox - \$18,000
  - DeltaTox - \$5,900, similar but without temp controls

### Maintenance Requirements

- Biomass replacement (if needed)
- Nutrient solution replacement (consumed at 0.6L/day)
- Periodic oxygen sensor, pump calibration



### Maintenance Requirements

- Media replacement
- Reagent replacement
- Periodic cleaning



# Hach's Event Monitoring System

## Event Monitoring System

- SCADA compliant communications
- “Learns” about baseline parameters
- After fingerprinting an event (e.g. what the parameters look like when a pump fails), the system can enumerate the event on its reoccurrence (“Hey guys, uh, pump #7 failed again”)

Multiple Locations  
In Distribution System

Event Monitor Trigger System



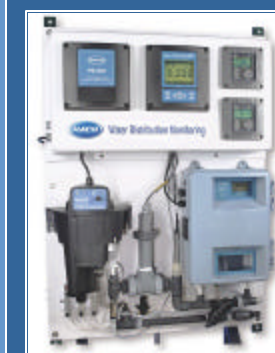
One or more locations  
Inside water plant

PipeSonde In-Pipe Probe - \$8k



- < pH
- < Conductivity
- < Turbidity
- < Temperature
- < ORP
- < Chlorine/DO
- < Line Pressure

Water Distribution Monitoring Panel - \$12.5k



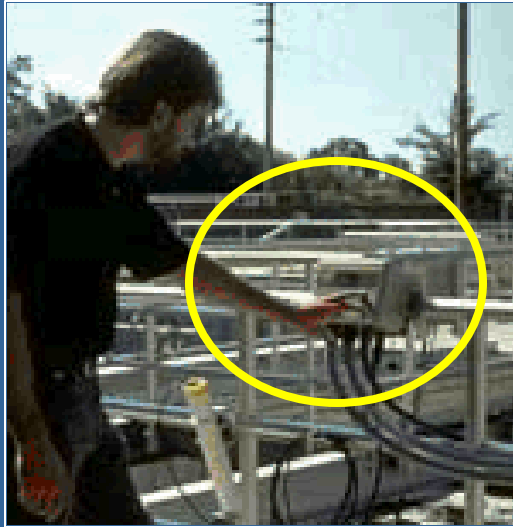
- < pH
- < Conductivity
- < Turbidity
- < Chlorine



# YSI's Sensor Logging Models

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YSI 6500 for SCADA



Stand-Alone Logging

Sensor Collector/Aggregator

Sensors



EcoNet

Web-enabled command & control

Access Node

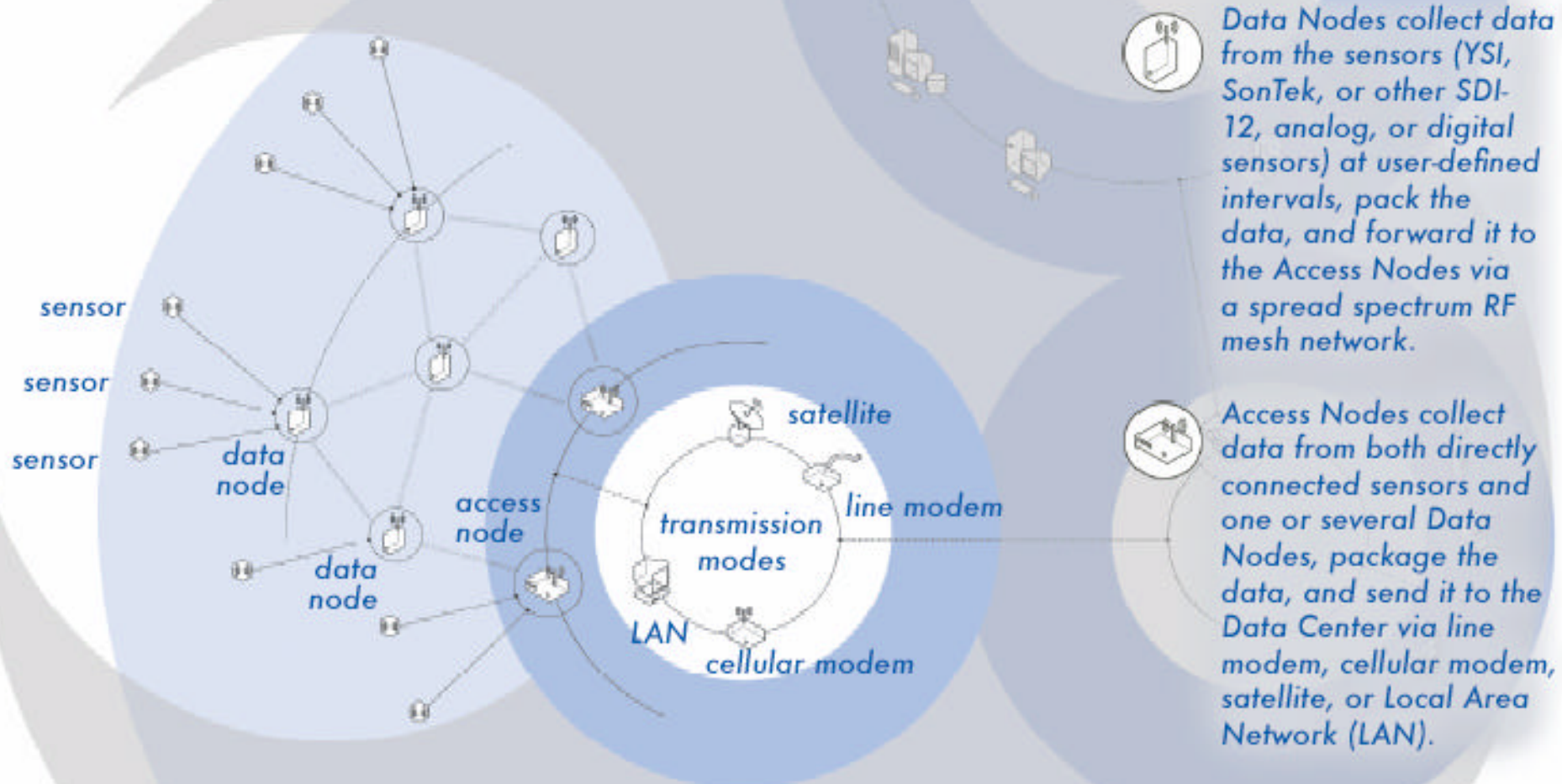
Access Node  
RF => Cell, WiFi,  
Sat, 56k, LAN

Laptop



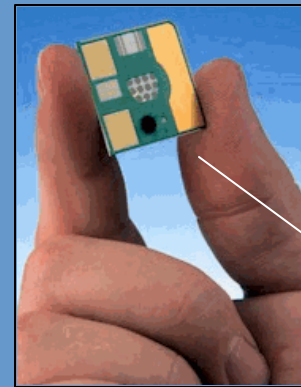
# YSI's EcoNet

## The YSI EcoNet™ Mesh Network



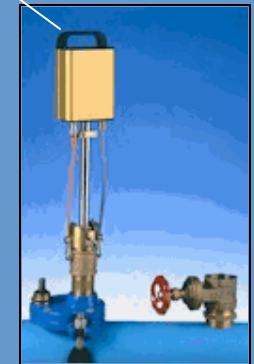
# Dascore - Vaporware

- Six CENSE
- Measures
  1. ORP
  2. Conductivity
  3. Temperature
  4. Chlorine
  5. DO
  6. pH
- 37mm stainless steel probe through 1.5" to 2" corporation stop
- SCADA-Compatible



## Maintenance Requirements

- Ceramic chip has 6 month average service life



# JMAR – BioSentry Prototype

- BioSentry
  - Trials underway Olivenhain Municipal Water District (San Diego)
  - Only detects microorganisms
- Using lasers, BioSentry detects fingerprint characteristics of microorganisms in the input water, then compares the collected data to a library of known fingerprints
- Detection Time (currently 1L/hr)
  - 1 minute – 5,000 organisms/liter
  - 10 minutes – 500 organisms/liter
  - 100 minutes – 50 organisms/liter



## Maintenance Characteristics

- Does not use consumables during normal operation

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